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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/636,038	08/06/2003	Gurtej S. Sandhu	MI22-2194	9972

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EXAMINER

FULLER, ERIC B

ART UNIT PAPER NUMBER

1762

DATE MAILED: 06/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/636,038	SANDHU, Gurtej S.	
	Examiner	Art Unit	
	Eric B. Fuller	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 28-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 28-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 6, 2006 has been entered.

Response to Arguments

Applicant argues that the prior art fails to teach "selectively" removing reaction products from the substrate. This is not found convincing. First, the phrase "selectively" is rather broad when it stands alone. The claims are not limited to what the gas selects for or selects against. Secondly, Brabant teaches that flowing HF removes substrate oxides. Since the gas removes surfaces oxides, this reads on "selectively" removing surface oxides. Lastly, HF is a hydrogen halide, which is claimed by the applicant to be the third gas. If HF does not inherently "selectively" remove reaction product, then the applicant's claims must be missing an essential feature that allows for their hydrogen halide to "selectively" remove products that the prior arts hydrogen halide does not.

Applicant argues that claims 16-18 are not inherent features of the first gas. This is not found convincing. Although it is not an inherent property of the gas, the first gas

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contacting the substrate in subsequent cycles is caused by the previous step of removing surface oxides that form. The amount of gas that contacts the substrate is therefore a function of how many impurities are formed in the previous cycle and how much of it is removed. The prior art rejection does not provide a step for reducing the amount of impurities formed, but does provide a step for maximizing the amount that is removed. Therefore, the first gas on subsequent cycles would inherently contact the substrate and this number would be within the applicant's range since the amount of impurities created is not reduced, only removed.

As to the newly added claims, these limitations are taught by the prior art. This will be shown below. Applicant's arguments have not been found convincing. The rejections of the previous Office Action have been maintained, accordingly.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-18 and 28-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art Brabant et al. (US 2003/0036268).

The applicant admits that ALD processes are known in forming films of hafnium dioxide or aluminum oxide, wherein the first reactant is a metal halide and the second reactant is oxygen or ozone. It is also explicitly taught that it is known that undesirable

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substrate oxides result when chemisorption of the first reactant is incomplete (page 4, lines 1-10). What is taught to be unknown is removing undesirable substrate oxides by flowing gaseous HF into the chamber. However, Brabant teaches that removing substrate oxides by flowing HF over the substrate increases purity in an ALD process [0011] and [0028]. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize the HF flow as a step in at least some of the ALD cycles. By doing so, one would reap the benefits of removing the undesirable substrate oxides that form during the oxidation step.

As to the dependent claims, non-uniform chemisorption over a silicon substrate would inherently result in silicon dioxide being the surface oxide. The "at least some of the ALD cycles" reads on not using it some cycles. Claims 16-18 claim inherent properties of the first reactant.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

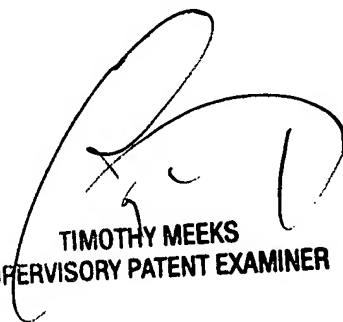
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks, can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



EBF



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER